CLAIMS

1. A color reproduction system comprising:

color image input means for sensing an object;

color estimation means for calculating tristimulus

5   values from a color image signal obtained by said color

image input means; and

color image output means for outputting a color

image signal based on a color represented by the

tristimulus values obtained by said color estimation

10   means,

said color estimation means including:

illumination light measuring means for measuring

tristimulus values of observation illumination light,

virtual illumination light spectrum calculation

15   means for calculating a virtual illumination light

spectrum that provides tristimulus values equal to the

tristimulus values of the observation illumination

light which are obtained by said illumination light

measuring means, and

20   tristimulus value calculation means for

calculating tristimulus values of the object under the

virtual illumination light spectrum from the color

image signal.

2. A system according to claim 1, wherein

25   said virtual illumination light spectrum calculation

means calculates a spectrum from a linear combination of

predetermined illumination light spectrum basis

functions.

3. A system according to claim 1, wherein said virtual illumination light spectrum calculation means calculates a spectrum corresponding to linear conversion between a product of a spectral sensitivity of said color image input means and a photographing illumination light spectrum and a product of a color matching function and the virtual illumination light spectrum.

10   4. A system according to claim 1, wherein said color image input means and said illumination light measuring means are positioned under different kinds of illumination light.

5. A color reproduction system comprising:

15   color image input means for sensing an object;

color estimation means for calculating tristimulus values from a color image signal obtained by said color image input means; and

color image output means for outputting a color

20   based on the tristimulus values obtained by said color estimation means,

said color estimation means including:

illumination light measuring means for measuring tristimulus values of observation illumination light;

25   tristimulus value calculating means for calculating tristimulus values of the object under a predetermined standard illumination light spectrum

from the color image signal, and

corresponding color calculation means for
calculating tristimulus values that provide
"appearance" of the color of the object which is
5   based on the tristimulus values under the standard
illumination light spectrum.

6.   A color reproduction system which can sense
a predetermined object as a color image, perform color
correction of the sensed color image, and perform data
10   transfer through a line, comprising:

a color camera for sensing the object under
photographing illumination light;

a simplified *Spectrophotometer* ~~spectrometer~~ for measuring a spectrum
of the photographing illumination light;

15   an illumination light colorimeter for measuring
tristimulus values of observation illumination light
on an object observation side, and transferring the
tristimulus value data of the observation illumination
light to a color correction device through a line;

20   a color correction device for calculating
tristimulus values of the object under the virtual
illumination light spectrum generated on the basis of
the transferred tristimulus values of the observation
illumination light, and converting the tristimulus
25   values into a monitor signal by using monitor profile
data; and

a monitor for displaying a color image including

an object image color-corrected by said color
correction device.

7. A system according to claim 6, wherein said
color correction device comprises:

5   a storage device storing a *basis* function ρ of
a daylight spectrum, monitor profile data MTP, color
matching function data CMF, and spectral sensitivity
data h of said RGB color camera in advance;

a virtual illumination light spectrum calculator
10   for calculating virtual illumination light spectrum
data OS from tristimulus values IXYZ of observation
illumination light measured by said illumination light
colorimeter and the *basis* function ρ from said storage
device;

15   a spectral reflectance calculator for calculating
spectral reflectance data f of the object from object
characteristic data σ and the spectral sensitivity data
h from said storage device, RGB image data CRGB input
from said RGB color camera, and a photographing
20   illumination light spectrum from a simplified
spectrophotometer;

a tristimulus value calculator for calculating
tristimulus value data OXYZ of the object from the
color matching function data CMF from said storage
25   device, the virtual illumination light spectrum data OS
from said virtual illumination light spectrum
calculator, and the spectral reflectance data f from

said spectral reflectance calculator; and

an output signal calculator for calculating the RGB image data CRGB serving as the monitor signal from the monitor profile data MTP from said storage device and the tristimulus value data OXYZ from said tristimulus value calculator.

8. A system according to claim 6, wherein said color correction device comprises:

a storage device storing the monitor profile data MTP, the color matching function data CMF, and the spectral sensitivity data h of said RGB color camera in advance;

a virtual illumination light spectrum calculator for calculating a conversion matrix MTX from the tristimulus values IXYZ of the observation illumination light measured by said illumination light measuring device, the monitor profile data MTP from said storage device, and the color matching function data CMF;

a tristimulus value calculator for calculating the tristimulus value data OXYZ of the object from the conversion matrix MTX from said virtual illumination light spectrum calculator and the RGB image data CRGB input from said RGB color camera; and

an output signal calculator for calculating RGB image data CRGB serving as the monitor signal from the monitor profile data MTP from said storage device and the tristimulus value data OXYZ from said tristimulus

value calculator.

9. A system according to claim 8, wherein said color correction device comprises:

a storage device storing object characteristic data σ, monitor profile data MTP, color matching function data CMF, standard illumination light spectrum data SS, tristimulus values JXYZ of standard illumination light, and spectral sensitivity data h of said RGB color camera;

a spectral reflectance calculator for calculating spectral reflectance data f of the object from the object characteristic data σ and spectral sensitivity data h from said storage device, RGB image data CRGB input from said RGB color camera, and photographing illumination light spectrum data MS from said simplified spectrophotometer;

a tristimulus value calculator for calculating tristimulus values SXYZ of the object under standard illumination light from the spectral reflectance data f from said spectral reflectance calculator and the color matching function data CMF and standard illumination light spectrum data SS from said storage device;

a corresponding color calculator for calculating tristimulus values CXYZ of a corresponding color of said object from the tristimulus values SXYZ from said tristimulus value calculator, tristimulus values JXYZ of standard illumination light from said storage device,

and tristimulus values IXYZ of observation illumination

light from said illumination light colorimeter; and

an output signal calculator for calculating RGB

image data CRGB serving as the monitor signal from the

5   tristimulus values CXYZ from said corresponding color

calculator and the monitor profile data MTP from said

storage device.

10.· A system according to claim 6, wherein said

color camera and said monitor are positioned under

10   different kinds of illumination light, and image

propagation is performed by wire communication.

11. A system according to claim 6, wherein said

color camera and said monitor are positioned under

different kinds of illumination light, and image

15   propagation is performed by radio communication.

12. A system according to claim 6, wherein said

system comprises a plurality of color chips, each

having a known spectral reflectance, and a digital

camera having a known spectral sensitivity in place of

20   said illumination light colorimeter, and

said color chips are arranged near said monitor

and reflected light of observation illumination light

reflected by each color chip is photographed by

said digital camera, thereby calculating tristimulus

25   values of the observation illumination light from

a photographing signal of each color chip which is

obtained by photographing, spectral sensitivity data of

said digital camera, spectral reflectance data of each color chip, and color matching data.